Federal Communications Commission
Washington, D.C. 20554

August 23, 2016

Marlene H. Dortch

Secretary
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

RE: Peer Review of Professor Marc Rysman's White Paper *Empirics of Business Data Services* (revised June 2016); *Business Data Services in an Internet Protocol Environment; Investigation of Certain Price Cap Local Exchange Carrier Business Data Services Tariff Pricing Plans; Special Access for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, WC Docket Nos. 16-143, 15-247, 05-25, RM-10593.

Dear Ms. Dortch:

The Wireline Competition Bureau (Bureau) hereby incorporates into the record in the business data services (special access) proceeding additional materials related to the peer review of Professor Marc Rysman's white paper, "Empirics of Business Data Services" (Rysman Paper), included with the Commission's Tariff Investigation Order and Further Notice of Proposed Rulemaking released May 2, 2016.[1]

Consistent with Office of Management and Budget (OMB) peer review guidelines,[2] the Commission initiated an external peer review of the Rysman Paper, seeking the analysis of Andrew Sweeting, Associate Professor of Economics, University of Maryland, and Tommaso Valletti, Professor of Economics, Imperial College London.[3] The Commission subsequently received written peer review

[1] *See Business Data Services in an Internet Protocol Environment; Investigation of Certain Price Cap Local Exchange Carrier Business Data Services Tariff Pricing Plans; Special Access for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, WC Docket Nos. 16-143, 15-247, 05-25, RM-10593, Tariff Investigation Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 4723, 4919, Appx. B, Dr. Marc Rysman, *Empirics of Business Data Services* (June 2016) (*Business Data Services Order* or *Business Data Services FNPRM*).

[2] Final Information Quality Bulletin for Peer Review, Office of Management and Budget, Executive Office of the President, 70 Fed. Reg. 2664 (Jan. 14, 2005) (requiring that influential scientific information on which a federal agency relies in a rulemaking proceeding be subject to peer review to enhance the quality and credibility of the government's scientific information).

[3] *See* Memorandum from Mathew S. DelNero, Chief, Wireline Competition Bureau, to Andrew Sweeting, Associate Professor, University of Maryland (Apr. 14, 2016), https://www.fcc.gov/peer-review-business-data-services-industry-white-paper; Memorandum from Mathew S. DelNero, Chief, Wireline Competition Bureau, to Tommaso Valletti, Associate Professor, University of Maryland (Apr. 14, 2016).

reports from Professors Sweeting and Valletti analyzing the Rysman Paper.[4] On June 28, 2016, the Commission released a revised Rysman Paper and a memorandum prepared by the Commission staff responding to the peer review feedback (FCC Staff Memorandum).[5]

After reviewing the FCC Staff Memorandum, Dr. Sweeting suggested estimating cluster-robust standard errors using a geographic area larger than the census block.[6] The Commission hereby incorporates a revised FCC Staff Memorandum, which addresses Dr. Sweeting's further suggestion by estimating the cluster-robust standard errors at the census tract and county levels into the relevant dockets in the business data services proceeding. The Bureau also published the revised FCC Staff Memorandum on the Commission's Peer Review Agenda webpage.[7]

Respectfully submitted,

_____/s/_____
William Layton
Assistant Division Chief
Pricing Policy Division
Wireline Competition Bureau
Federal Communications Commission

[4] Andrew Sweeting, Associate Professor, University of Maryland, College Park, "Review of Dr. Rysman's 'Empirics of Business Data Services' White Paper (Apr. 16, 2016), https://www.fcc.gov/peer-review-business-data-services-industry-white-paper; Letter from Tommaso Valletti, Professor of Economics, Imperial College London, to Matthew DelNero, Chief, Wireline Competition Bureau (dated Apr. 28, 2016), https://www.fcc.gov/peer-review-business-data-services-industry-white-paper.

[5] *See Wireline Competition Bureau Releases Peer Review Materials in Business Data Services (Special Access) Rulemaking Proceeding*, WC Docket Nos. 16-143, 15-247, and 05-25 and RM-10593, Public Notice, DA 16-728 (WCB June 28, 2016); *see also Wireline Competition Bureau Updates Staff Regression Analysis From Peer Review of* Empirics of Business Data Services *White Paper*, WC Docket Nos. 16-143, 15-247, and 05-25 and RM-10593, Public Notice, DA 16-788 (WCB July 8, 2016) (updating certain tables in the FCC Staff Memorandum as well as portions of the text describing the results).

[6] Letter from Andrew Sweeting, Associate Professor, University of Maryland, College Park, to Matthew DelNero, Chief, Wireline Competition Bureau (dated July 13, 2016), https://www.fcc.gov/peer-review-business-data-services-industry-white-paper.

[7] Peer Review of Business Data Services Industry White Paper, https://www.fcc.gov/peer-review-business-data-services-industry-white-paper.

Update on the Use of Cluster-Robust Standard Errors in Business Data Services Regressions

Federal Communications Commission Staff

August 22, 2016

On May 2, 2016, the Federal Communications Commission (Commission) released a Tariff Investigation Order and Further Notice of Proposed Rulemaking in the business data services (special access) rulemaking proceeding.[1] The item included a white paper prepared by an outside econometrician hired by the Commission, Dr. Marc Rysman, entitled "Empirics of Business Data Services" (Rysman Paper).[2]

Consistent with Office of Management and Budget (OMB) peer review guidelines,[3] the Commission initiated an external peer review of the Rysman Paper, seeking the analysis of Andrew Sweeting, Associate Professor of Economics, University of Maryland, and Tommaso Valletti, Professor of Economics, Imperial College London.[4] The Commission subsequently received written peer review reports from Professors Sweeting and Valletti analyzing the Rysman Paper.[5] On June 28, 2016, the Commission released a revised Rysman Paper and a memorandum prepared by the Commission staff responding to the peer review feedback (FCC Staff Memorandum).[6]

Attachment 1 of the FCC Staff Memorandum implemented the suggestion of both peer reviewers, and Dr. Rysman, regarding the use of cluster-robust standard errors in the regression analysis, applying the correction at the level of the census block as suggested by Dr. Andrew Sweeting. After reviewing the

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[1] *See Business Data Services in an Internet Protocol Environment Investigation of Certain Price Cap Local Exchange Carrier Business Data Services Tariff Pricing Plans; Special Access for Price Cap Local Exchange Carriers; AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, WC Docket Nos. 16-143, 15-247, 05-25, RM-10593, Tariff Investigation Order and Further Notice of Proposed Rulemaking, FCC 16-54 (rel. May 2, 2016) (*Business Data Services Order* or *Business Data Services FNPRM*).

[2] *Id*., Appx. B, Dr. Marc Rysman, *Empirics of Business Data Services* (Apr. 2016) (Rysman Paper).

[3] Final Information Quality Bulletin for Peer Review, Office of Management and Budget, Executive Office of the President, 70 Fed. Reg. 2664 (Jan. 14, 2005) (requiring that influential scientific information on which a federal agency relies in a rulemaking proceeding be subject to peer review to enhance the quality and credibility of the government's scientific information).

[4] *See* Memorandum from Mathew S. DelNero, Chief, Wireline Competition Bureau, to Andrew Sweeting, Associate Professor, University of Maryland (Apr. 14, 2016), https://www.fcc.gov/peer-review-business-data-services-industry-white-paper; Memorandum from Mathew S. DelNero, Chief, Wireline Competition Bureau, to Tommaso Valletti, Associate Professor, University of Maryland (Apr. 14, 2016).

[5] Andrew Sweeting, Associate Professor, University of Maryland, College Park, "Review of Dr. Rysman's 'Empirics of Business Data Services' White Paper (Apr. 16, 2016), https://www.fcc.gov/peer-review-business-data-services-industry-white-paper; Letter from Tommaso Valletti, Professor of Economics, Imperial College London, to Matthew DelNero, Chief, Wireline Competition Bureau (dated Apr. 28, 2016), https://www.fcc.gov/peer-review-business-data-services-industry-white-paper.

[6] *See Wireline Competition Bureau Releases Peer Review Materials in Business Data Services (Special Access) Rulemaking Proceeding*, WC Docket Nos. 16-143, 15-247, and 05-25 an RM-10593, Public Notice, DA 16-728 (WCB June 28, 2016).

FCC Staff Memorandum, Dr. Sweeting suggested estimating cluster-robust standard errors using a geographic area larger than the census block.[7] This document addresses Dr. Sweeting's further suggestion by estimating the cluster-robust standard errors at the census tract and county levels. We considered further analysis of cluster-robust standard errors at coarser geographic units, such as the Metropolitan Statistical Area. However, we concluded in discussions with Dr. Rysman, that when our analysis is conducted with fixed effects at a given level of geography (such as the census tract or county), then cluster-robust standard errors should not be applied beyond that level of geography, since the issues that are meant to be addressed by clustering are appropriately and accurately addressed by the fixed effects.

The first seven tables of this document, numbered 14 through 20, revise Attachment 1 of the FCC Staff Memorandum. They replicate the identically numbered tables in the Rysman Paper. These tables present the results of regression models using both census tract and county fixed effects. When the regression model uses census tract fixed effects, the cluster-robust standard errors are estimated with the census tract as the clustering unit. When the regression model uses county fixed effects, the cluster-robust standard errors are estimated with the county as the clustering unit. While the use of cluster-robust standard errors does not change the estimated coefficients, the results of hypothesis tests on those coefficients will change when the standard errors change. In the tables, we highlight those coefficients for which a test of the null hypothesis that the coefficient is zero has a different outcome than that reported in the Rysman Paper. In most instances of a change, it is the case that under robust standard errors the null hypothesis was rejected, while using cluster-robust standard errors, the null hypothesis that the coefficient is equal to zero cannot be rejected.

Focusing on DS1s and DS3s, applying cluster robust-errors at the higher levels of geographies led to the loss of statistical significance of some of the competition variables as compared with our previous analysis, with the strongest effect occurring for DS3s. However, as discussed in Attachment 2 of the FCC Staff Memorandum, the key regressions are those of Table 20, which control for regulatory status. In those, the competition variables in the two DS3 regressions are not materially changed, except that the unexpected positive coefficient for competition in price cap areas becomes statistically insignificant. Similarly, the changes to the DS1 results are also minor: the small but statistically significant impact of competition in price cap only areas becomes statistically insignificant, and statistical significance is lost broadly for the county fixed effects regression. However, tract fixed effects have been our preferred specification given the size of most counties, and this is especially so for DS1s, the deployment of which is likely to be more distance-dependent than for DS3s.

The remaining tables in this document revise Attachment 2 of the FCC Staff Memorandum. The regression models in these tables use census tract fixed effects for all regressions. Consequently we use cluster-robust standard errors at the census tract level. As with the previous tables, we highlight those coefficients for which a test of the null hypothesis that the coefficient is zero has a different outcome than that reported in the FCC Staff Memorandum.

[7] Letter from Andrew Sweeting, Associate Professor, University of Maryland, College Park, to Matthew DelNero, Chief, Wireline Competition Bureau (dated July 13, 2016), https://www.fcc.gov/peer-review-business-data-services-industry-white-paper.

Again focusing on DS1s and DS3s, with the tract level cluster-robust standard errors, again a number of our competition variables lose statistical significance (again more often for DS3s than DS1s). However, it remains the case that overall the regressions show competition lowers ILEC prices by an amount that is statistically distinguishable from no effect. These competitive effects occur more often at the level of the building for DS1s, and in the block for DS3s, and especially in pricing flexibility Phase II areas (*see* Table 1).

Revised FCC Staff Memorandum, Attachment 1

Table 14: Regression of Log Price on Competition in the Census Block
Rysman Paper Table 14 with Cluster-Robust Standard Errors

	DS-1 Tract FE/CRSE	DS-3 Tract FE/CRSE	Hi-Band Tract FE/CRSE	DS-1 County FE/CRSE	DS-3 County FE/CRSE	Hi-Band County FE/CRSE
A Facilities-based Competitor is in the Census Block	-0.032	-0.109	0.023	-0.056	-0.114	0.046
	(0.006)*	(0.059)	(0.036)	(0.012)*	(0.051)*	(0.046)
Customer is a Telecommunications Provider	-0.196	-0.025	0.135	-0.131	0.014	0.145
	(0.011)*	(0.043)	(0.052)*	(0.024)*	(0.053)	(0.072)*
Customer is a Mobile Telecommunications Provider	0.103	0.194	-0.201	0.148	0.199	-0.364
	(0.007)*	(0.050)*	(0.104)	(0.017)*	(0.055)*	(0.073)*
Customer is a Cable Operator	-0.073	-0.050	-0.464	-0.055	-0.006	-0.472
	(0.010)*	(0.049)	(0.258)	(0.031)	(0.051)	(0.201)*
Natural Log of Establishments in the Zip Code	0.008	0.030	-0.141	-0.023	0.070	-0.010
	(0.019)	(0.144)	(0.107)	(0.012)*	(0.080)	(0.048)
Natural Log of Annual Payroll in the Zip Code	-0.016	-0.052	0.073	-0.082	0.113	0.123
	(0.028)	(0.230)	(0.171)	(0.016)*	(0.075)	(0.067)
Natural Log of Employment in the Zip Code	-0.004	0.106	0.043	0.045	-0.182	-0.111
	(0.039)	(0.302)	(0.244)	(0.019)*	(0.120)	(0.081)
Natural Log of Number of Establishments in the Census Block (D&B)	0.011	-0.024	0.005	0.021	0.062	0.028
	(0.003)*	(0.034)	(0.016)	(0.005)*	(0.030)*	(0.015)
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.006	0.045	-0.003	-0.030	-0.060	-0.042
	(0.002)*	(0.026)	(0.014)	(0.003)*	(0.021)*	(0.014)*
Natural Log of Mbps			0.247			0.198
			(0.052)*			(0.046)*
Packet-based Connection			-0.532			-0.660
			(0.098)*			(0.137)*
Adjusted R-Squared	0.33	0.26	0.45	0.18	0.10	0.29
F Statistic	109.25	4.55	10.44	58.89	3.17	11.18
Observations	1,399,170	120,110	80,318	1,399,170	120,110	80,318

* $p<0.05$
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 15: Regression of Log Price on Competition and CLEC Network in the Census Block
Rysman Paper Table 15 with Cluster-Robust Standard Errors

	DS-1 Tract FE/CRSE	DS-3 Tract FE/CRSE	Hi-Band Tract FE/CRSE	DS-1 County FE/CRSE	DS-3 County FE/CRSE	Hi-Band County FE/CRSE
A Facilities-based Competitor is in the Census Block	-0.032	-0.108	0.025	-0.052	-0.104	0.054
	(0.006)*	(0.060)	(0.036)	(0.012)*	(0.050)*	(0.046)
An Indep. CLEC Has a Fiber Network in the Census Block	-0.003	-0.014	-0.030	-0.046	-0.121	-0.073
	(0.005)	(0.061)	(0.036)	(0.008)*	(0.049)*	(0.050)
Customer is a Telecommunications Provider	-0.196	-0.025	0.136	-0.131	0.012	0.146
	(0.011)*	(0.043)	(0.052)*	(0.024)*	(0.054)	(0.072)*
Customer is a Mobile Telecommunications Provider	0.103	0.194	-0.201	0.148	0.196	-0.364
	(0.007)*	(0.050)*	(0.104)	(0.017)*	(0.056)*	(0.073)*
Customer is a Cable Operator	-0.073	-0.050	-0.464	-0.055	-0.006	-0.467
	(0.010)*	(0.049)	(0.258)	(0.031)	(0.051)	(0.200)*
Natural Log of Establishments in the Zip Code	0.008	0.030	-0.141	-0.022	0.075	-0.010
	(0.019)	(0.144)	(0.107)	(0.012)	(0.080)	(0.048)
Natural Log of Annual Payroll in the Zip Code	-0.016	-0.052	0.074	-0.081	0.124	0.124
	(0.028)	(0.230)	(0.171)	(0.015)*	(0.074)	(0.066)
Natural Log of Employment in the Zip Code	-0.004	0.105	0.042	0.045	-0.196	-0.111
	(0.039)	(0.302)	(0.244)	(0.019)*	(0.119)	(0.080)
Natural Log of Number of Establishments in the Census Block (D&B)	0.012	-0.024	0.006	0.022	0.064	0.029
	(0.003)*	(0.034)	(0.017)	(0.005)*	(0.030)*	(0.015)*
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.007	0.045	-0.003	-0.030	-0.059	-0.043
	(0.002)*	(0.026)	(0.014)	(0.003)*	(0.021)*	(0.014)*
Natural Log of Mbps			0.247			0.198
			(0.052)*			(0.046)*
Packet-based Connection			-0.532			-0.660
			(0.098)*			(0.137)*
Adjusted R-Squared	0.33	0.26	0.45	0.18	0.10	0.29
F Statistic	98.32	4.18	9.63	58.49	3.19	11.29
Observations	1,399,170	120,110	80,318	1,399,170	120,110	80,318

* $p<0.05$
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 16: Regression of Log Price on Competition interacted with the Presence of Fiber in the Block
Rysman Paper Table 16 with Cluster-Robust Standard Errors

	DS-1 Tract FE/CRSE	DS-3 Tract FE/CRSE	Hi-Band Tract FE/CRSE	DS-1 County FE/CRSE	DS-3 County FE/CRSE	Hi-Band County FE/CRSE
A Facilities-based Competitor is in the Census Block	-0.017	0.030	0.040	-0.016	-0.024	0.085
	(0.012)	(0.124)	(0.083)	(0.020)	(0.106)	(0.078)
An Indep. CLEC Has a Fiber Network in the Census Block	0.000	0.035	-0.028	-0.038	-0.090	-0.066
	(0.006)	(0.065)	(0.038)	(0.008)*	(0.066)	(0.056)
Ind. CLEC Fiber Network in CB x Facilities-based CLEC in Building in CB	-0.016	-0.148	-0.016	-0.040	-0.087	-0.033
	(0.013)	(0.135)	(0.089)	(0.018)*	(0.126)	(0.081)
Customer is a Telecommunications Provider	-0.196	-0.025	0.135	-0.131	0.011	0.146
	(0.011)*	(0.043)	(0.052)*	(0.024)*	(0.054)	(0.072)*
Customer is a Mobile Telecommunications Provider	0.103	0.194	-0.201	0.147	0.194	-0.364
	(0.007)*	(0.050)*	(0.104)	(0.017)*	(0.056)*	(0.073)*
Customer is a Cable Operator	-0.073	-0.050	-0.464	-0.055	-0.007	-0.467
	(0.010)*	(0.049)	(0.258)	(0.031)	(0.052)	(0.200)*
Natural Log of Establishments in the Zip Code	0.009	0.032	-0.141	-0.022	0.078	-0.010
	(0.019)	(0.145)	(0.107)	(0.011)	(0.080)	(0.048)
Natural Log of Annual Payroll in the Zip Code	-0.016	-0.049	0.074	-0.079	0.128	0.125
	(0.028)	(0.230)	(0.171)	(0.016)*	(0.074)	(0.066)
Natural Log of Employment in the Zip Code	-0.004	0.102	0.042	0.043	-0.204	-0.112

	(0.039)	(0.303)	(0.244)	(0.019)*	(0.119)	(0.080)
Natural Log of Number of Establishments in the Census Block (D&B)	0.012	-0.024	0.006	0.022	0.064	0.029
	(0.003)*	(0.034)	(0.017)	(0.005)*	(0.030)*	(0.015)*
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.007	0.045	-0.003	-0.030	-0.059	-0.042
	(0.002)*	(0.026)	(0.014)	(0.003)*	(0.021)*	(0.014)*
Natural Log of Mbps			0.247			0.198
			(0.052)*			(0.046)*
Packet-based Connection			-0.532			-0.659
			(0.098)*			(0.137)*
Adjusted R-Squared	0.33	0.26	0.45	0.18	0.10	0.29
F Statistic	89.56	3.82	8.89	53.86	2.83	10.56
Observations	1,399,170	120,110	80,318	1,399,170	120,110	80,318

* $p<0.05$

Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 17: Regression of Log Price on Competition in the Building and the Block
Rysman Paper Table 17 with Cluster-Robust Standard Errors

	DS-1 Tract FE/CRSE	DS-3 Tract FE/CRSE	Hi-Band Tract FE/CRSE	DS-1 County FE/CRSE	DS-3 County FE/CRSE	Hi-Band County FE/CRSE
A Facilities-based Competitor is in the Building	-0.047	-0.063	-0.023	-0.066	-0.047	-0.014
	(0.008)*	(0.059)	(0.043)	(0.016)*	(0.053)	(0.044)
At Least One Facilities-based Competitor is in the Block But Not the Building	-0.027	-0.118	0.054	-0.044	-0.124	0.062
	(0.007)*	(0.073)	(0.038)	(0.009)*	(0.048)*	(0.035)
Customer is a Telecommunications Provider	-0.197	-0.026	0.135	-0.132	0.012	0.147
	(0.011)*	(0.043)	(0.052)*	(0.024)*	(0.053)	(0.072)*
Customer is a Mobile Telecommunications Provider	0.104	0.195	-0.202	0.149	0.198	-0.363
	(0.007)*	(0.050)*	(0.104)	(0.017)*	(0.055)*	(0.073)*
Customer is a Cable Operator	-0.073	-0.049	-0.462	-0.055	-0.005	-0.466
	(0.010)*	(0.048)	(0.259)	(0.031)	(0.052)	(0.202)*
Natural Log of Establishments in the Zip Code	0.009	0.037	-0.145	-0.023	0.066	-0.007
	(0.019)	(0.145)	(0.105)	(0.011)*	(0.079)	(0.047)
Natural Log of Annual Payroll in the Zip Code	-0.012	-0.021	0.063	-0.073	0.121	0.124
	(0.028)	(0.233)	(0.169)	(0.015)*	(0.074)	(0.068)
Natural Log of Employment in the Zip Code	-0.008	0.068	0.056	0.037	-0.186	-0.114
	(0.039)	(0.305)	(0.240)	(0.017)*	(0.117)	(0.081)
Natural Log of Number of Establishments in the Census Block (D&B)	0.012	-0.016	-0.000	0.021	0.071	0.022
	(0.003)*	(0.029)	(0.017)	(0.005)*	(0.029)*	(0.015)
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.006	0.044	0.000	-0.028	-0.061	-0.037
	(0.002)*	(0.026)	(0.015)	(0.003)*	(0.020)*	(0.013)*
Natural Log of Mbps			0.247			0.197
			(0.052)*			(0.046)*
Packet-based Connection			-0.530			-0.659
			(0.097)*			(0.137)*
Adjusted R-Squared	0.33	0.26	0.45	0.18	0.10	0.29
F Statistic	98.14	4.05	9.86	55.55	3.27	10.95
Observations	1,399,170	120,110	80,318	1,399,170	120,110	80,318

* $p<0.05$

Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 18: Regression of Log Price on Competition in the Building, the Block, and the Tract
Rysman Paper Table 18 with Cluster-Robust Standard Errors

	DS-1 Tract FE/CRSE	DS-3 Tract FE/CRSE	Hi-Band Tract FE/CRSE	DS-1 County FE/CRSE	DS-3 County FE/CRSE	Hi-Band County FE/CRSE
A Facilities-based Competitor is in the Building	-0.051	-0.074	-0.026	-0.069	-0.049	-0.023
	(0.009)*	(0.060)	(0.043)	(0.016)*	(0.053)	(0.043)
At Least One Facilities-based Competitor is in the Block But Not the Building	-0.033	-0.136	0.049	-0.049	-0.126	0.058
	(0.008)*	(0.076)	(0.039)	(0.009)*	(0.048)*	(0.036)
At Least One Facilities-based Competitor is in the Tract But Not the Block	-0.030	-0.210	-0.039	-0.039	-0.036	-0.073
	(0.009)*	(0.092)*	(0.049)	(0.011)*	(0.046)	(0.051)
Customer is a Telecommunications Provider	-0.197	-0.025	0.135	-0.133	0.011	0.146
	(0.011)*	(0.043)	(0.052)*	(0.024)*	(0.053)	(0.072)*
Customer is a Mobile Telecommunications Provider	0.103	0.194	-0.202	0.148	0.198	-0.366
	(0.007)*	(0.050)*	(0.104)	(0.017)*	(0.055)*	(0.073)*
Customer is a Cable Operator	-0.073	-0.049	-0.462	-0.055	-0.006	-0.469
	(0.010)*	(0.048)	(0.259)	(0.031)	(0.052)	(0.202)*
Natural Log of Establishments in the Zip Code	0.008	0.039	-0.144	-0.025	0.065	-0.008
	(0.019)	(0.146)	(0.105)	(0.011)*	(0.078)	(0.048)
Natural Log of Annual Payroll in the Zip Code	-0.011	-0.023	0.064	-0.065	0.126	0.134
	(0.028)	(0.235)	(0.169)	(0.015)*	(0.075)	(0.071)
Natural Log of Employment in the Zip Code	-0.009	0.069	0.055	0.032	-0.189	-0.120
	(0.039)	(0.308)	(0.240)	(0.017)	(0.117)	(0.083)
Natural Log of Number of Establishments in the Census Block (D&B)	0.012	-0.020	-0.001	0.021	0.070	0.021
	(0.003)*	(0.029)	(0.017)	(0.005)*	(0.029)*	(0.015)

Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.006	0.047	0.001	-0.027	-0.060	-0.036
	(0.002)*	(0.026)	(0.015)	(0.003)*	(0.020)*	(0.013)*
Natural Log of Mbps			0.247			0.198
			(0.052)*			(0.046)*
Packet-based Connection			-0.530			-0.658
			(0.097)*			(0.137)*
Adjusted R-Squared	0.33	0.26	0.45	0.18	0.10	0.29
F Statistic	89.12	3.87	9.39	50.88	3.02	10.89
Observations	1,399,170	120,110	80,318	1,399,170	120,110	80,318

* $p<0.05$

Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 19: Regression of Log Price on Number of Competitors in the Census Block
Rysman Paper Table 19 with Cluster-Robust Standard Errors

	DS-1 Tract FE/CRSE	DS-3 Tract FE/CRSE	DS-1 County FE/CRSE	DS-3 County FE/CRSE
A Facilities-based Competitor is in the Building	-0.048	-0.066	-0.065	-0.052
	(0.008)*	(0.058)	(0.016)*	(0.052)
One Facilities-based Competitor is in the Block But Not the Building	-0.018	-0.095	-0.028	-0.070
	(0.006)*	(0.091)	(0.011)*	(0.047)
Two or Three Facilities-based Competitors are in the Block But Not the Building	-0.051	-0.154	-0.075	-0.160
	(0.012)*	(0.079)	(0.017)*	(0.067)*
Four or More Facilities-based Competitors are in the Block But Not the Building	-0.040	-0.132	-0.065	-0.280
	(0.030)	(0.117)	(0.031)*	(0.123)*
Customer is a Telecommunications Provider	-0.197	-0.025	-0.132	0.010
	(0.011)*	(0.044)	(0.024)*	(0.054)
Customer is a Mobile Telecommunications Provider	0.103	0.195	0.149	0.194
	(0.007)*	(0.050)*	(0.017)*	(0.056)*
Customer is a Cable Operator	-0.073	-0.049	-0.056	-0.010
	(0.010)*	(0.048)	(0.031)	(0.051)
Natural Log of Establishments in the Zip Code	0.008	0.038	-0.025	0.064
	(0.019)	(0.146)	(0.011)*	(0.075)
Natural Log of Annual Payroll in the Zip Code	-0.008	-0.011	-0.068	0.144
	(0.028)	(0.236)	(0.016)*	(0.075)
Natural Log of Employment in the Zip Code	-0.011	0.057	0.034	-0.209
	(0.039)	(0.308)	(0.018)	(0.116)
Natural Log of Number of Establishments in the Census Block (D&B)	0.013	-0.014	0.023	0.080
	(0.003)*	(0.030)	(0.005)*	(0.029)*
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.006	0.043	-0.028	-0.060
	(0.002)*	(0.026)	(0.003)*	(0.020)*
Adjusted R-Squared	0.33	0.26	0.18	0.11
F Statistic	82.27	3.69	47.88	2.92
Observations	1,399,170	120,110	1,399,170	120,110

* $p<0.05$
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 20: Regression of Log Price on Competition in the Block, by Price Flex Regulation
Rysman Paper Table 20 with Cluster-Robust Standard Errors

	DS-1 Tract FE/CRSE	DS-3 Tract FE/CRSE	DS-1 County FE/CRSE	DS-3 County FE/CRSE
A Facilities-based Competitor is in the Census Block	0.001	0.126	-0.009	0.060
	(0.010)	(0.072)	(0.052)	(0.075)
Phase 1 x Facilities-based Competitor in Census Block	-0.038	-0.337	-0.073	-0.221
	(0.013)*	(0.104)*	(0.055)	(0.102)*
Phase 2 x Facilities-based Competitor in Census Block	-0.048	-0.265	-0.040	-0.191
	(0.016)*	(0.104)*	(0.070)	(0.088)*
Customer is a Telecommunications Provider	-0.196	-0.024	-0.130	0.012
	(0.011)*	(0.043)	(0.024)*	(0.053)
Customer is a Mobile Telecommunications Provider	0.103	0.195	0.148	0.200
	(0.007)*	(0.050)*	(0.017)*	(0.054)*
Customer is a Cable Operator	-0.073	-0.051	-0.054	-0.004
	(0.010)*	(0.049)	(0.031)	(0.051)
Natural Log of Establishments in the Zip Code	0.009	0.037	-0.024	0.069
	(0.019)	(0.145)	(0.012)*	(0.080)
Natural Log of Annual Payroll in the Zip Code	-0.015	-0.039	-0.079	0.118
	(0.028)	(0.230)	(0.016)*	(0.075)
Natural Log of Employment in the Zip Code	-0.005	0.083	0.043	-0.185
	(0.039)	(0.303)	(0.019)*	(0.120)
Natural Log of Number of Establishments in the Census Block (D&B)	0.012	-0.025	0.021	0.063
	(0.003)*	(0.034)	(0.005)*	(0.030)*
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.006	0.046	-0.030	-0.060
	(0.002)*	(0.026)	(0.003)*	(0.021)*
Adjusted R-Squared	0.33	0.26	0.18	0.10
F Statistic	89.92	4.70	50.24	3.45
Observations	1,399,170	120,110	1,399,170	120,110

* $p<0.05$

Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Revised FCC Staff Memorandum, Attachment 2

Table 1: Summary of the Regression Results

Competition Variable	DS-1			DS-3			High Bandwidth		
	Price Cap	Phase I	Phase II	Price Cap	Phase I	Phase II	Price Cap	Phase I	Phase II
A Facilities-based Competitor is in the Census Block	-, (-)	(-), (-)	-, -	(+), (+)	(-), (-)	-, -	(+), (+)	(+), (+)	(-), (+)
A Facilities-based Competitor is in the Building	-, -, -	-, -, -	-, -, -	(+),(+),(+)	(-),(-),(-)	(-), (-), (-)	(+), (+), (+)	(+),(-),(+)	(-),(-),(-)
At Least One Facilities-based Competitor is in the Block But Not the Building	(-), (-)	(-), -	-, -	(-), (-)	(-), (-)	(-), (-)	(+), (+)	(-), (-)	(+), (+)
At Least One Facilities-based Competitor is in the Tract But Not the Block	(-)	-	-	(-)	-	(-)	(-)	(-)	(-)
One Facilities-based Competitor is in the Block But Not the Building	(-)	-	(-)	(-)	(-)	(-)	(+)	(+)	(+)
Two or Three Facilities-based Competitors are in the Block But Not the Building	(-)	(-)	-	(-)	(-)	(-)	(+)	(-)	(+)
Four or More Facilities-based Competitors are in the Block But Not the Building	(-)	(+)	(-)	(+)	(-)	(-)	(+)	(-)	(+)
An Indep. CLEC Has a Fiber Network in the Census Block	(-)	(+)	(+)	(-)	(-)	(+)	(+)	(-)	(-)

+ and – indicate that the estimated coefficient on the competition variable was positive or negative and statistically different from zero at the 95% level of confidence. If enclosed in parenthesis the coefficient was not statistically different from zero at the 95% level of confidence.

This table does not include results from Tables 16a, b, c and 20ab. Due to the interaction terms in the regression specification, the sign, and statistical significance, may vary depending on the values of other variables in the regression.

Table 14a: Regression of Log of DS-1 Price on Competition in the Census Block
Based on Rysman Paper Table 14

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Census Block	-0.032	-0.025	-0.020	-0.014	-0.012	-0.044
	(0.006)*	(0.005)*	(0.005)*	(0.007)*	(0.008)	(0.011)*
Customer is a Telecommunications Provider	-0.196	-0.196	-0.166	-0.089	-0.259	-0.087
	(0.011)*	(0.011)*	(0.010)*	(0.014)*	(0.016)*	(0.018)*
Customer is a Mobile Telecommunications Provider	0.103	0.103	0.090	0.034	0.138	0.098
	(0.007)*	(0.007)*	(0.006)*	(0.007)*	(0.010)*	(0.012)*
Customer is a Cable Operator	-0.073	-0.073	-0.078	-0.159	-0.053	-0.069
	(0.010)*	(0.010)*	(0.009)*	(0.041)*	(0.012)*	(0.013)*
Natural Log of Establishments in the Zip Code	0.008					
	(0.019)					
Natural Log of Employment in the Zip Code	-0.004					
	(0.039)					
Natural Log of Annual Payroll in the Zip Code	-0.016					
	(0.028)					
Natural Log of Number of Establishments in the Census Block (D&B)	0.011					
	(0.003)*					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.006					
	(0.002)*					
Log of Establishments per Square Mile in the Zip Code		0.007	0.026	0.025	0.017	0.019
		(0.020)	(0.018)	(0.018)	(0.036)	(0.030)
Log of Employment per Square Mile in the Zip Code		-0.020	-0.039	-0.055	-0.029	-0.013
		(0.016)	(0.013)*	(0.014)*	(0.025)	(0.025)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		-0.011	0.023	-0.022	0.017	0.064
		(0.028)	(0.027)	(0.027)	(0.043)	(0.049)
Adjusted R-Squared	0.33	0.33	0.38	0.44	0.29	0.38
F Statistic	109.25	138.68	135.83	21.51	120.71	35.69
Observations	1,399,170	1,399,165	1,806,659	579,119	679,520	548,020

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 14b: Regression of Log of DS-3 Price on Competition in the Census Block
Based on Rysman Paper Table 14

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Census Block	-0.109	-0.112	-0.056	0.055	-0.028	-0.209
	(0.059)	(0.052)*	(0.054)	(0.058)	(0.098)	(0.077)*
Customer is a Telecommunications Provider	-0.025	-0.025	-0.033	-0.132	-0.034	0.086
	(0.043)	(0.043)	(0.040)	(0.075)	(0.064)	(0.061)
Customer is a Mobile Telecommunications Provider	0.194	0.194	0.198	0.094	0.248	0.223
	(0.050)*	(0.050)*	(0.045)*	(0.048)*	(0.059)*	(0.100)*
Customer is a Cable Operator	-0.050	-0.050	-0.063	0.085	-0.116	-0.036
	(0.049)	(0.049)	(0.046)	(0.063)	(0.083)	(0.046)
Natural Log of Establishments in the Zip Code	0.030					
	(0.144)					
Natural Log of Employment in the Zip Code	0.106					
	(0.302)					
Natural Log of Annual Payroll in the Zip Code	-0.052					
	(0.230)					
Natural Log of Number of Establishments in the Census Block (D&B)	-0.024					
	(0.034)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	0.045					
	(0.026)					
Log of Establishments per Square Mile in the Zip Code		-0.019	0.077	0.001	0.127	-0.108
		(0.124)	(0.133)	(0.135)	(0.244)	(0.161)
Log of Employment per Square Mile in the Zip Code		0.022	0.058	0.029	0.003	0.156
		(0.121)	(0.112)	(0.098)	(0.250)	(0.134)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.018	0.213	-0.441	0.557	-0.069
		(0.251)	(0.204)	(0.222)*	(0.284)	(0.378)
Adjusted R-Squared	0.26	0.26	0.28	0.42	0.24	0.27
F Statistic	4.55	4.38	6.12	1.86	5.40	2.56
Observations	120,110	120,109	138,158	27,253	58,790	52,115

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 14c: Regression of Log of High Bandwidth Price on Competition in the Census Block
Based on Rysman Paper Table 14

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Census Block	0.023	0.026	0.022	0.082	0.003	-0.002
	(0.036)	(0.034)	(0.029)	(0.045)	(0.048)	(0.036)
Customer is a Telecommunications Provider	0.135	0.135	0.137	0.193	0.005	0.497
	(0.052)*	(0.052)*	(0.044)*	(0.053)*	(0.061)	(0.090)*
Customer is a Mobile Telecommunications Provider	-0.201	-0.202	-0.212	-0.203	-0.132	-0.324
	(0.104)	(0.104)	(0.083)*	(0.041)*	(0.148)	(0.058)*
Customer is a Cable Operator	-0.464	-0.463	-0.352	-0.099	-0.117	-0.679
	(0.258)	(0.258)	(0.204)	(0.189)	(0.253)	(0.323)*
Natural Log of Establishments in the Zip Code	-0.141					
	(0.107)					
Natural Log of Employment in the Zip Code	0.043					
	(0.244)					
Natural Log of Annual Payroll in the Zip Code	0.073					
	(0.171)					
Natural Log of Number of Establishments in the Census Block (D&B)	0.005					
	(0.016)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.003					
	(0.014)					
Natural Log of Mbps	0.247	0.247	0.240	0.102	0.236	0.397
	(0.052)*	(0.052)*	(0.046)*	(0.037)*	(0.076)*	(0.021)*
Packet-based Connection	-0.532	-0.531	-0.620	-1.353	-0.020	-0.217
	(0.098)*	(0.098)*	(0.091)*	(0.131)*	(0.091)	(0.164)
Log of Establishments per Square Mile in the Zip Code		-0.155	-0.098	0.150	-0.297	-0.039
		(0.120)	(0.097)	(0.111)	(0.179)	(0.150)
Log of Employment per Square Mile in the Zip Code		0.116	0.085	-0.084	0.221	0.032
		(0.107)	(0.082)	(0.094)	(0.165)	(0.138)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.092	-0.018	-0.106	0.007	0.113
		(0.174)	(0.132)	(0.148)	(0.309)	(0.165)
Adjusted R-Squared	0.45	0.45	0.52	0.71	0.41	0.48
F Statistic	10.44	12.81	13.57	20.00	9.36	79.20
Observations	80,318	80,318	100,513	30,553	48,499	21,461

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 15a: Regression of Log of DS-1 Price on Competition and Indep. CLEC Network in the Census Block
Based on Rysman Paper Table 15

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Census Block	-0.032	-0.025	-0.020	-0.013	-0.012	-0.045
	(0.006)*	(0.005)*	(0.005)*	(0.007)	(0.008)	(0.011)*
An Indep. CLEC Has a Fiber Network in the Census Block	-0.003	0.004	-0.003	-0.009	0.003	0.009
	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)	(0.013)
Customer is a Telecommunications Provider	-0.196	-0.196	-0.166	-0.089	-0.259	-0.087
	(0.011)*	(0.011)*	(0.010)*	(0.014)*	(0.016)*	(0.018)*
Customer is a Mobile Telecommunications Provider	0.103	0.103	0.090	0.034	0.138	0.098
	(0.007)*	(0.007)*	(0.006)*	(0.007)*	(0.010)*	(0.012)*
Customer is a Cable Operator	-0.073	-0.073	-0.078	-0.159	-0.053	-0.069
	(0.010)*	(0.010)*	(0.009)*	(0.041)*	(0.012)*	(0.013)*
Natural Log of Establishments in the Zip Code	0.008					
	(0.019)					
Natural Log of Employment in the Zip Code	-0.004					
	(0.039)					
Natural Log of Annual Payroll in the Zip Code	-0.016					
	(0.028)					
Natural Log of Number of Establishments in the Census Block (D&B)	0.012					
	(0.003)*					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.007					
	(0.002)*					
Log of Establishments per Square Mile in the Zip Code		0.007	0.026	0.025	0.017	0.019
		(0.020)	(0.018)	(0.018)	(0.036)	(0.030)
Log of Employment per Square Mile in the Zip Code		-0.020	-0.039	-0.054	-0.029	-0.013
		(0.016)	(0.013)*	(0.014)*	(0.025)	(0.025)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		-0.011	0.023	-0.022	0.017	0.064
		(0.028)	(0.027)	(0.027)	(0.044)	(0.049)
Adjusted R-Squared	0.33	0.33	0.38	0.44	0.29	0.38
F Statistic	98.32	121.41	118.86	18.91	105.63	31.38
Observations	1,399,170	1,399,165	1,806,659	579,119	679,520	548,020

* $p<0.05$

Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 15b: Regression of Log of DS-3 Price on Competition and Indep. CLEC Network in the Census Block
Based on Rysman Paper Table 15

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Census Block	-0.108	-0.109	-0.050	0.060	-0.017	-0.210
	(0.060)	(0.053)*	(0.055)	(0.059)	(0.099)	(0.079)*
An Indep. CLEC Has a Fiber Network in the Census Block	-0.014	-0.036	-0.076	-0.054	-0.159	0.006
	(0.061)	(0.058)	(0.047)	(0.062)	(0.096)	(0.090)
Customer is a Telecommunications Provider	-0.025	-0.025	-0.034	-0.134	-0.034	0.086
	(0.043)	(0.043)	(0.040)	(0.075)	(0.064)	(0.061)
Customer is a Mobile Telecommunications Provider	0.194	0.194	0.199	0.094	0.249	0.223
	(0.050)*	(0.050)*	(0.045)*	(0.048)*	(0.059)*	(0.100)*
Customer is a Cable Operator	-0.050	-0.050	-0.063	0.086	-0.116	-0.036
	(0.049)	(0.049)	(0.046)	(0.063)	(0.083)	(0.046)
Natural Log of Establishments in the Zip Code	0.030					
	(0.144)					
Natural Log of Employment in the Zip Code	0.105					
	(0.302)					
Natural Log of Annual Payroll in the Zip Code	-0.052					
	(0.230)					
Natural Log of Number of Establishments in the Census Block (D&B)	-0.024					
	(0.034)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	0.045					
	(0.026)					
Log of Establishments per Square Mile in the Zip Code		-0.019	0.077	0.000	0.125	-0.108
		(0.123)	(0.133)	(0.135)	(0.244)	(0.161)
Log of Employment per Square Mile in the Zip Code		0.022	0.058	0.029	0.002	0.156
		(0.121)	(0.112)	(0.098)	(0.250)	(0.134)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.018	0.214	-0.440	0.562	-0.069
		(0.251)	(0.204)	(0.222)*	(0.284)*	(0.378)
Adjusted R-Squared	0.26	0.26	0.28	0.42	0.24	0.27
F Statistic	4.18	3.96	5.72	1.75	4.95	2.26
Observations	120,110	120,109	138,158	27,253	58,790	52,115

* $p<0.05$

Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 15c: Regression of Log of High Bandwidth Price on Competition and Indep. CLEC Network in the Census Block
Based on Rysman Paper Table 15

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Census Block	0.025	0.029	0.024	0.081	0.005	0.007
	(0.036)	(0.035)	(0.029)	(0.047)	(0.049)	(0.036)
An Indep. CLEC Has a Fiber Network in the Census Block	-0.030	-0.027	-0.023	0.006	-0.017	-0.082
	(0.036)	(0.035)	(0.030)	(0.040)	(0.053)	(0.049)
Customer is a Telecommunications Provider	0.136	0.135	0.137	0.194	0.005	0.498
	(0.052)*	(0.052)*	(0.044)*	(0.053)*	(0.061)	(0.092)*
Customer is a Mobile Telecommunications Provider	-0.201	-0.201	-0.212	-0.203	-0.132	-0.324
	(0.104)	(0.104)	(0.083)*	(0.041)*	(0.148)	(0.065)*
Customer is a Cable Operator	-0.464	-0.463	-0.351	-0.100	-0.117	-0.673
	(0.258)	(0.258)	(0.204)	(0.190)	(0.253)	(0.329)*
Natural Log of Establishments in the Zip Code	-0.141					
	(0.107)					
Natural Log of Employment in the Zip Code	0.042					
	(0.244)					
Natural Log of Annual Payroll in the Zip Code	0.074					
	(0.171)					
Natural Log of Number of Establishments in the Census Block (D&B)	0.006					
	(0.017)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.003					
	(0.014)					
Natural Log of Mbps	0.247	0.247	0.240	0.102	0.236	0.397
	(0.052)*	(0.052)*	(0.046)*	(0.037)*	(0.076)*	(0.022)*
Packet-based Connection	-0.532	-0.531	-0.620	-1.353	-0.020	-0.216
	(0.098)*	(0.098)*	(0.091)*	(0.131)*	(0.091)	(0.168)
Log of Establishments per Square Mile in the Zip Code		-0.155	-0.098	0.150	-0.296	-0.043
		(0.120)	(0.096)	(0.111)	(0.179)	(0.163)
Log of Employment per Square Mile in the Zip Code		0.115	0.085	-0.084	0.221	0.036
		(0.107)	(0.082)	(0.093)	(0.165)	(0.150)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.093	-0.018	-0.107	0.008	0.106
		(0.174)	(0.132)	(0.148)	(0.309)	(0.184)
Adjusted R-Squared	0.45	0.45	0.52	0.71	0.41	0.48
F Statistic	9.63	11.59	12.29	18.03	8.43	67.71
Observations	80,318	80,318	100,513	30,553	48,499	21,461

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 16a: Regression of Log of DS-1 Price on Competition interacted with Indep. CLEC Network in the Census Block
Based on Rysman Paper Table 16

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Census Block	-0.017	-0.013	-0.016	-0.022	-0.027	0.011
	(0.012)	(0.012)	(0.010)	(0.013)	(0.020)	(0.022)
An Indep. CLEC Has a Fiber Network in the Census Block	0.000	0.006	-0.002	-0.011	0.001	0.021
	(0.006)	(0.006)	(0.005)	(0.007)	(0.008)	(0.014)
Ind. CLEC Fiber Network in CB x Facilities-based CLEC in Building in CB	-0.016	-0.014	-0.005	0.012	0.015	-0.061
	(0.013)	(0.013)	(0.011)	(0.015)	(0.021)	(0.024)*
Customer is a Telecommunications Provider	-0.196	-0.196	-0.166	-0.089	-0.259	-0.087
	(0.011)*	(0.011)*	(0.010)*	(0.014)*	(0.016)*	(0.018)*
Customer is a Mobile Telecommunications Provider	0.103	0.103	0.090	0.034	0.138	0.098
	(0.007)*	(0.007)*	(0.006)*	(0.007)*	(0.010)*	(0.012)*
Customer is a Cable Operator	-0.073	-0.073	-0.078	-0.159	-0.053	-0.069
	(0.010)*	(0.010)*	(0.009)*	(0.041)*	(0.012)*	(0.013)*
Natural Log of Establishments in the Zip Code	0.009					
	(0.019)					
Natural Log of Employment in the Zip Code	-0.004					
	(0.039)					
Natural Log of Annual Payroll in the Zip Code	-0.016					
	(0.028)					
Natural Log of Number of Establishments in the Census Block (D&B)	0.012					
	(0.003)*					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.007					
	(0.002)*					
Log of Establishments per Square Mile in the Zip Code		0.007	0.026	0.025	0.017	0.020
		(0.020)	(0.018)	(0.018)	(0.036)	(0.031)
Log of Employment per Square Mile in the Zip Code		-0.020	-0.039	-0.054	-0.029	-0.014
		(0.016)	(0.013)*	(0.014)*	(0.025)	(0.025)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		-0.010	0.023	-0.022	0.017	0.066
		(0.028)	(0.027)	(0.027)	(0.043)	(0.049)
Adjusted R-Squared	0.33	0.33	0.38	0.44	0.29	0.38
F Statistic	89.56	108.20	105.69	16.90	94.04	28.34
Observations	1,399,170	1,399,165	1,806,659	579,119	679,520	548,020

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 16b: Regression of Log of DS-3 Price on Competition interacted with Indep. CLEC Network in the Census Block
Based on Rysman Paper Table 16

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Census Block	0.030	0.028	0.002	0.153	0.024	-0.218
	(0.124)	(0.124)	(0.094)	(0.130)	(0.241)	(0.151)
An Indep. CLEC Has a Fiber Network in the Census Block	0.035	0.013	-0.059	-0.019	-0.148	0.004
	(0.065)	(0.064)	(0.054)	(0.066)	(0.085)	(0.114)
Ind. CLEC Fiber Network in CB x Facilities-based CLEC in Building in CB	-0.148	-0.148	-0.057	-0.111	-0.043	0.009
	(0.135)	(0.136)	(0.110)	(0.142)	(0.265)	(0.172)
Customer is a Telecommunications Provider	-0.025	-0.025	-0.034	-0.135	-0.034	0.086
	(0.043)	(0.043)	(0.040)	(0.075)	(0.064)	(0.061)
Customer is a Mobile Telecommunications Provider	0.194	0.194	0.199	0.094	0.249	0.223
	(0.050)*	(0.050)*	(0.045)*	(0.048)*	(0.059)*	(0.101)*
Customer is a Cable Operator	-0.050	-0.050	-0.063	0.087	-0.116	-0.036
	(0.049)	(0.049)	(0.046)	(0.064)	(0.083)	(0.046)
Natural Log of Establishments in the Zip Code	0.032					
	(0.145)					
Natural Log of Employment in the Zip Code	0.102					
	(0.303)					
Natural Log of Annual Payroll in the Zip Code	-0.049					
	(0.230)					
Natural Log of Number of Establishments in the Census Block (D&B)	-0.024					
	(0.034)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	0.045					
	(0.026)					
Log of Establishments per Square Mile in the Zip Code		-0.017	0.078	0.004	0.126	-0.109
		(0.124)	(0.133)	(0.134)	(0.245)	(0.161)
Log of Employment per Square Mile in the Zip Code		0.021	0.058	0.027	0.002	0.156
		(0.122)	(0.112)	(0.097)	(0.250)	(0.134)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.019	0.215	-0.448	0.562	-0.069
		(0.251)	(0.204)	(0.221)*	(0.286)*	(0.378)
Adjusted R-Squared	0.26	0.26	0.28	0.42	0.24	0.27
F Statistic	3.82	3.53	5.08	1.60	4.68	2.10
Observations	120,110	120,109	138,158	27,253	58,790	52,115

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 16c: Regression of Log of High Bandwidth Price on Competition interacted with Indep. CLEC Network in the Census Block
Based on Rysman Paper Table 16

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Census Block	0.040	0.044	0.124	0.112	0.127	0.161
	(0.083)	(0.083)	(0.068)	(0.084)	(0.163)	(0.128)
An Indep. CLEC Has a Fiber Network in the Census Block	-0.028	-0.024	-0.006	0.011	0.009	-0.051
	(0.038)	(0.038)	(0.032)	(0.045)	(0.045)	(0.049)
Ind. CLEC Fiber Network in CB x Facilities-based CLEC in Building in CB	-0.016	-0.016	-0.109	-0.039	-0.126	-0.165
	(0.089)	(0.089)	(0.073)	(0.095)	(0.168)	(0.132)
Customer is a Telecommunications Provider	0.135	0.135	0.137	0.193	0.005	0.497
	(0.052)*	(0.052)*	(0.044)*	(0.053)*	(0.061)	(0.092)*
Customer is a Mobile Telecommunications Provider	-0.201	-0.201	-0.212	-0.203	-0.132	-0.324
	(0.104)	(0.104)	(0.083)*	(0.041)*	(0.148)	(0.065)*
Customer is a Cable Operator	-0.464	-0.463	-0.352	-0.100	-0.117	-0.675
	(0.258)	(0.258)	(0.205)	(0.190)	(0.253)	(0.329)*
Natural Log of Establishments in the Zip Code	-0.141					
	(0.107)					
Natural Log of Employment in the Zip Code	0.042					
	(0.244)					
Natural Log of Annual Payroll in the Zip Code	0.074					
	(0.171)					
Natural Log of Number of Establishments in the Census Block (D&B)	0.006					
	(0.017)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.003					
	(0.014)					
Natural Log of Mbps	0.247	0.247	0.240	0.102	0.236	0.397
	(0.052)*	(0.052)*	(0.046)*	(0.037)*	(0.076)*	(0.022)*
Packet-based Connection	-0.532	-0.531	-0.620	-1.354	-0.019	-0.215
	(0.098)*	(0.098)*	(0.091)*	(0.131)*	(0.091)	(0.168)
Log of Establishments per Square Mile in the Zip Code		-0.155	-0.099	0.150	-0.296	-0.047
		(0.120)	(0.096)	(0.111)	(0.179)	(0.162)
Log of Employment per Square Mile in the Zip Code		0.115	0.085	-0.084	0.221	0.039
		(0.107)	(0.082)	(0.093)	(0.165)	(0.149)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.093	-0.018	-0.107	0.008	0.103
		(0.174)	(0.132)	(0.148)	(0.309)	(0.183)
Adjusted R-Squared	0.45	0.45	0.52	0.71	0.41	0.48
F Statistic	8.89	10.54	11.68	16.44	7.70	61.63
Observations	80,318	80,318	100,513	30,553	48,499	21,461

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 17a: Regression of Log of DS-1 Price on Competition in the Building and the Block
Based on Rysman Paper Table 17

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Building	-0.047	-0.045	-0.039	-0.027	-0.032	-0.059
	(0.008)*	(0.008)*	(0.008)*	(0.012)*	(0.010)*	(0.017)*
At Least One Facilities-based Competitor is in the Block But Not the Building	-0.027	-0.018	-0.017	-0.009	-0.017	-0.025
	(0.007)*	(0.007)*	(0.006)*	(0.007)	(0.010)	(0.012)*
Customer is a Telecommunications Provider	-0.197	-0.197	-0.167	-0.089	-0.260	-0.087
	(0.011)*	(0.012)*	(0.010)*	(0.014)*	(0.016)*	(0.018)*
Customer is a Mobile Telecommunications Provider	0.104	0.103	0.090	0.034	0.138	0.098
	(0.007)*	(0.007)*	(0.006)*	(0.007)*	(0.010)*	(0.012)*
Customer is a Cable Operator	-0.073	-0.073	-0.078	-0.158	-0.054	-0.069
	(0.010)*	(0.010)*	(0.009)*	(0.041)*	(0.012)*	(0.013)*
Natural Log of Establishments in the Zip Code	0.009					
	(0.019)					
Natural Log of Employment in the Zip Code	-0.008					
	(0.039)					
Natural Log of Annual Payroll in the Zip Code	-0.012					
	(0.028)					
Natural Log of Number of Establishments in the Census Block (D&B)	0.012					
	(0.003)*					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.006					
	(0.002)*					
Log of Establishments per Square Mile in the Zip Code		0.008	0.027	0.025	0.019	0.020
		(0.019)	(0.018)	(0.018)	(0.036)	(0.030)
Log of Employment per Square Mile in the Zip Code		-0.020	-0.039	-0.054	-0.030	-0.013
		(0.016)	(0.013)*	(0.014)*	(0.024)	(0.024)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		-0.007	0.026	-0.022	0.021	0.066
		(0.028)	(0.027)	(0.027)	(0.045)	(0.048)
Adjusted R-Squared	0.33	0.33	0.38	0.44	0.29	0.38
F Statistic	98.14	122.23	122.17	19.07	108.81	31.41
Observations	1,399,170	1,399,165	1,806,659	579,119	679,520	548,020

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 17b: Regression of Log of DS-3 Price on Competition in the Building and the Block
Based on Rysman Paper Table 16

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Building	-0.063	-0.056	-0.034	0.109	-0.035	-0.138
	(0.059)	(0.059)	(0.056)	(0.095)	(0.087)	(0.088)
At Least One Facilities-based Competitor is in the Block But Not the Building	-0.118	-0.118	-0.083	-0.028	-0.112	-0.081
	(0.073)	(0.076)	(0.066)	(0.081)	(0.114)	(0.091)
Customer is a Telecommunications Provider	-0.026	-0.026	-0.034	-0.132	-0.038	0.088
	(0.043)	(0.043)	(0.040)	(0.076)	(0.064)	(0.061)
Customer is a Mobile Telecommunications Provider	0.195	0.194	0.198	0.095	0.247	0.225
	(0.050)*	(0.050)*	(0.045)*	(0.048)*	(0.059)*	(0.101)*
Customer is a Cable Operator	-0.049	-0.049	-0.062	0.088	-0.115	-0.035
	(0.048)	(0.048)	(0.045)	(0.064)	(0.082)	(0.046)
Natural Log of Establishments in the Zip Code	0.037					
	(0.145)					
Natural Log of Employment in the Zip Code	0.068					
	(0.305)					
Natural Log of Annual Payroll in the Zip Code	-0.021					
	(0.233)					
Natural Log of Number of Establishments in the Census Block (D&B)	-0.016					
	(0.029)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	0.044					
	(0.026)					
Log of Establishments per Square Mile in the Zip Code		-0.011	0.085	0.000	0.148	-0.110
		(0.124)	(0.131)	(0.136)	(0.236)	(0.162)
Log of Employment per Square Mile in the Zip Code		0.016	0.056	0.029	-0.001	0.148
		(0.123)	(0.112)	(0.098)	(0.250)	(0.134)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.046	0.234	-0.442	0.587	-0.047
		(0.258)	(0.202)	(0.222)*	(0.277)*	(0.381)
Adjusted R-Squared	0.26	0.26	0.28	0.42	0.25	0.27
F Statistic	4.05	3.44	4.88	1.61	4.77	1.56
Observations	120,110	120,109	138,158	27,253	58,790	52,115

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 17c: Regression of Log of High Bandwidth Price on Competition in the Building and the Block
Based on Rysman Paper Table 17

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Building	-0.023	-0.022	-0.005	0.117	0.003	-0.055
	(0.043)	(0.042)	(0.038)	(0.063)	(0.050)	(0.047)
At Least One Facilities-based Competitor is in the Block But Not the Building	0.054	0.054	0.041	0.055	-0.006	0.049
	(0.038)	(0.035)	(0.031)	(0.048)	(0.040)	(0.041)
Customer is a Telecommunications Provider	0.135	0.136	0.137	0.193	0.005	0.497
	(0.052)*	(0.052)*	(0.044)*	(0.053)*	(0.061)	(0.091)*
Customer is a Mobile Telecommunications Provider	-0.202	-0.202	-0.212	-0.202	-0.132	-0.325
	(0.104)	(0.104)	(0.083)*	(0.041)*	(0.147)	(0.065)*
Customer is a Cable Operator	-0.462	-0.462	-0.352	-0.105	-0.117	-0.679
	(0.259)	(0.259)	(0.204)	(0.189)	(0.254)	(0.330)*
Natural Log of Establishments in the Zip Code	-0.145					
	(0.105)					
Natural Log of Employment in the Zip Code	0.056					
	(0.240)					
Natural Log of Annual Payroll in the Zip Code	0.063					
	(0.169)					
Natural Log of Number of Establishments in the Census Block (D&B)	-0.000					
	(0.017)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	0.000					
	(0.015)					
Natural Log of Mbps	0.247	0.247	0.240	0.101	0.236	0.398
	(0.052)*	(0.052)*	(0.046)*	(0.037)*	(0.076)*	(0.022)*
Packet-based Connection	-0.530	-0.530	-0.620	-1.353	-0.020	-0.219
	(0.097)*	(0.097)*	(0.090)*	(0.131)*	(0.091)	(0.168)
Log of Establishments per Square Mile in the Zip Code		-0.156	-0.099	0.149	-0.296	-0.032
		(0.119)	(0.096)	(0.111)	(0.178)	(0.160)
Log of Employment per Square Mile in the Zip Code		0.118	0.085	-0.084	0.221	0.029
		(0.106)	(0.082)	(0.093)	(0.165)	(0.146)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.081	-0.022	-0.107	0.009	0.108
		(0.172)	(0.131)	(0.148)	(0.309)	(0.182)
Adjusted R-Squared	0.45	0.45	0.52	0.71	0.41	0.48
F Statistic	9.86	11.95	12.88	18.40	8.41	68.89
Observations	80,318	80,318	100,513	30,553	48,499	21,461

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 18a: Regression of Log of DS-1 Price on Competition in the Building, the Block, and the Tract
Based on Rysman Paper Table 18

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Building	-0.051	-0.049	-0.043	-0.029	-0.036	-0.064
	(0.009)*	(0.008)*	(0.008)*	(0.013)*	(0.010)*	(0.017)*
At Least One Facilities-based Competitor is in the Block But Not the Building	-0.033	-0.025	-0.023	-0.011	-0.024	-0.032
	(0.008)*	(0.008)*	(0.007)*	(0.008)	(0.011)*	(0.014)*
At Least One Facilities-based Competitor is in the Tract But Not the Block	-0.030	-0.032	-0.028	-0.005	-0.035	-0.038
	(0.009)*	(0.009)*	(0.008)*	(0.012)	(0.012)*	(0.019)*
Customer is a Telecommunications Provider	-0.197	-0.197	-0.167	-0.089	-0.260	-0.087
	(0.011)*	(0.012)*	(0.010)*	(0.014)*	(0.016)*	(0.018)*
Customer is a Mobile Telecommunications Provider	0.103	0.103	0.090	0.034	0.138	0.098
	(0.007)*	(0.007)*	(0.006)*	(0.007)*	(0.010)*	(0.012)*
Customer is a Cable Operator	-0.073	-0.073	-0.078	-0.158	-0.054	-0.069
	(0.010)*	(0.010)*	(0.009)*	(0.041)*	(0.012)*	(0.013)*
Natural Log of Establishments in the Zip Code	0.008					
	(0.019)					
Natural Log of Employment in the Zip Code	-0.009					
	(0.039)					
Natural Log of Annual Payroll in the Zip Code	-0.011					
	(0.028)					
Natural Log of Number of Establishments in the Census Block (D&B)	0.012					
	(0.003)*					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.006					
	(0.002)*					
Log of Establishments per Square Mile in the Zip Code		0.008	0.027	0.025	0.020	0.020
		(0.019)	(0.018)	(0.018)	(0.036)	(0.030)
Log of Employment per Square Mile in the Zip Code		-0.020	-0.039	-0.054	-0.030	-0.014
		(0.016)	(0.013)*	(0.014)*	(0.024)	(0.024)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		-0.006	0.026	-0.022	0.022	0.068
		(0.028)	(0.028)	(0.027)	(0.045)	(0.047)
Adjusted R-Squared	0.33	0.33	0.38	0.44	0.29	0.38
F Statistic	89.12	108.46	108.58	16.99	96.73	28.14
Observations	1,399,170	1,399,165	1,806,659	579,119	679,520	548,020

* $p<0.05$

Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level

Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 18b: Regression of Log of DS-3 Price on Competition in the Building, the Block, and the Tract
Based on Rysman Paper Table 18

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Building	-0.074	-0.067	-0.046	0.098	-0.045	-0.150
	(0.060)	(0.060)	(0.057)	(0.095)	(0.088)	(0.090)
At Least One Facilities-based Competitor is in the Block But Not the Building	-0.136	-0.136	-0.101	-0.047	-0.127	-0.098
	(0.076)	(0.079)	(0.069)	(0.087)	(0.116)	(0.095)
At Least One Facilities-based Competitor is in the Tract But Not the Block	-0.210	-0.198	-0.187	-0.092	-0.273	-0.174
	(0.092)*	(0.090)*	(0.078)*	(0.086)	(0.128)*	(0.156)
Customer is a Telecommunications Provider	-0.025	-0.025	-0.034	-0.128	-0.040	0.088
	(0.043)	(0.043)	(0.040)	(0.076)	(0.065)	(0.061)
Customer is a Mobile Telecommunications Provider	0.194	0.193	0.198	0.095	0.246	0.224
	(0.050)*	(0.050)*	(0.045)*	(0.048)*	(0.059)*	(0.101)*
Customer is a Cable Operator	-0.049	-0.048	-0.061	0.088	-0.114	-0.033
	(0.048)	(0.048)	(0.045)	(0.064)	(0.082)	(0.046)
Natural Log of Establishments in the Zip Code	0.039					
	(0.146)					
Natural Log of Employment in the Zip Code	0.069					
	(0.308)					
Natural Log of Annual Payroll in the Zip Code	-0.023					
	(0.235)					
Natural Log of Number of Establishments in the Census Block (D&B)	-0.020					
	(0.029)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	0.047					
	(0.026)					
Log of Establishments per Square Mile in the Zip Code		-0.005	0.090	0.003	0.151	-0.107
		(0.124)	(0.131)	(0.136)	(0.236)	(0.162)
Log of Employment per Square Mile in the Zip Code		0.015	0.056	0.028	0.004	0.146
		(0.123)	(0.112)	(0.098)	(0.251)	(0.134)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.040	0.233	-0.445	0.569	-0.041
		(0.261)	(0.204)	(0.222)*	(0.280)*	(0.382)
Adjusted R-Squared	0.26	0.26	0.28	0.42	0.25	0.27
F Statistic	3.87	3.31	4.82	1.53	4.69	1.48
Observations	120,110	120,109	138,158	27,253	58,790	52,115

* $p<0.05$

Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 18c: Regression of Log of High Bandwidth Price on Competition in the Building, the Block, and the Tract
Based on Rysman Paper Table 18

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Building	-0.026	-0.025	-0.010	0.114	-0.002	-0.058
	(0.043)	(0.043)	(0.039)	(0.068)	(0.052)	(0.047)
At Least One Facilities-based Competitor is in the Block But Not the Building	0.049	0.049	0.034	0.052	-0.013	0.044
	(0.039)	(0.037)	(0.033)	(0.055)	(0.041)	(0.042)
At Least One Facilities-based Competitor is in the Tract But Not the Block	-0.039	-0.040	-0.046	-0.013	-0.078	-0.039
	(0.049)	(0.048)	(0.043)	(0.084)	(0.061)	(0.055)
Customer is a Telecommunications Provider	0.135	0.136	0.137	0.193	0.005	0.496
	(0.052)*	(0.051)*	(0.044)*	(0.053)*	(0.061)	(0.091)*
Customer is a Mobile Telecommunications Provider	-0.202	-0.202	-0.212	-0.202	-0.132	-0.325
	(0.104)	(0.104)	(0.083)*	(0.041)*	(0.147)	(0.065)*
Customer is a Cable Operator	-0.462	-0.462	-0.352	-0.105	-0.117	-0.679
	(0.259)	(0.259)	(0.204)	(0.189)	(0.254)	(0.330)*
Natural Log of Establishments in the Zip Code	-0.144					
	(0.105)					
Natural Log of Employment in the Zip Code	0.055					
	(0.240)					
Natural Log of Annual Payroll in the Zip Code	0.064					
	(0.169)					
Natural Log of Number of Establishments in the Census Block (D&B)	-0.001					
	(0.017)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	0.001					
	(0.015)					
Natural Log of Mbps	0.247	0.247	0.240	0.101	0.236	0.398
	(0.052)*	(0.052)*	(0.046)*	(0.037)*	(0.076)*	(0.022)*
Packet-based Connection	-0.530	-0.530	-0.620	-1.352	-0.020	-0.219
	(0.097)*	(0.097)*	(0.090)*	(0.131)*	(0.091)	(0.168)
Log of Establishments per Square Mile in the Zip Code		-0.156	-0.098	0.149	-0.296	-0.033
		(0.119)	(0.096)	(0.111)	(0.178)	(0.159)
Log of Employment per Square Mile in the Zip Code		0.118	0.085	-0.084	0.221	0.029
		(0.106)	(0.082)	(0.094)	(0.165)	(0.145)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.082	-0.020	-0.107	0.012	0.109
		(0.172)	(0.131)	(0.148)	(0.309)	(0.181)
Adjusted R-Squared	0.45	0.45	0.52	0.71	0.41	0.48
F Statistic	9.39	11.19	12.22	16.74	8.08	63.34
Observations	80,318	80,318	100,513	30,553	48,499	21,461

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 19a: Regression of Log of DS-1 Price on Number of Competitors in the Census Block
Based on Rysman Paper Table 19

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Building	-0.048	-0.045	-0.039	-0.027	-0.031	-0.061
	(0.008)*	(0.008)*	(0.008)*	(0.012)*	(0.010)*	(0.016)*
One Facilities-based Competitor is in the Block But Not the Building	-0.018	-0.010	-0.010	-0.010	-0.022	0.000
	(0.006)*	(0.006)	(0.005)	(0.007)	(0.008)*	(0.012)
Two or Three Facilities-based Competitors are in the Block But Not the Building	-0.051	-0.039	-0.034	-0.002	-0.016	-0.073
	(0.012)*	(0.011)*	(0.010)*	(0.016)	(0.014)	(0.021)*
Four or More Facilities-based Competitors are in the Block But Not the Building	-0.040	-0.023	-0.020	-0.053	0.007	-0.061
	(0.030)	(0.029)	(0.028)	(0.038)	(0.040)	(0.040)
Customer is a Telecommunications Provider	-0.197	-0.197	-0.167	-0.089	-0.259	-0.087
	(0.011)*	(0.011)*	(0.010)*	(0.014)*	(0.016)*	(0.018)*
Customer is a Mobile Telecommunications Provider	0.103	0.103	0.090	0.034	0.138	0.097
	(0.007)*	(0.007)*	(0.006)*	(0.007)*	(0.010)*	(0.012)*
Customer is a Cable Operator	-0.073	-0.073	-0.078	-0.158	-0.053	-0.070
	(0.010)*	(0.010)*	(0.009)*	(0.041)*	(0.012)*	(0.013)*
Natural Log of Establishments in the Zip Code	0.008					
	(0.019)					
Natural Log of Employment in the Zip Code	-0.011					
	(0.039)					
Natural Log of Annual Payroll in the Zip Code	-0.008					
	(0.028)					
Natural Log of Number of Establishments in the Census Block (D&B)	0.013					
	(0.003)*					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.006					
	(0.002)*					
Log of Establishments per Square Mile in the Zip Code		0.008	0.027	0.025	0.020	0.019
		(0.019)	(0.018)	(0.018)	(0.036)	(0.030)
Log of Employment per Square Mile in the Zip Code		-0.020	-0.039	-0.054	-0.031	-0.014
		(0.016)	(0.013)*	(0.014)*	(0.024)	(0.024)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		-0.004	0.028	-0.022	0.020	0.076
		(0.028)	(0.028)	(0.027)	(0.045)	(0.046)
Adjusted R-Squared	0.33	0.33	0.38	0.44	0.29	0.38
F Statistic	82.27	98.27	98.02	15.86	88.79	26.33
Observations	1,399,170	1,399,165	1,806,659	579,119	679,520	548,020

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 19b: Regression of Log of DS-3 Price on Number of Competitors in the Census Block
Based on Rysman Paper Table 19

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Building	-0.066	-0.060	-0.035	0.106	-0.025	-0.152
	(0.058)	(0.057)	(0.056)	(0.092)	(0.089)	(0.090)
One Facilities-based Competitor is in the Block But Not the Building	-0.095	-0.092	-0.064	-0.020	-0.102	-0.046
	(0.091)	(0.094)	(0.084)	(0.065)	(0.169)	(0.099)
Two or Three Facilities-based Competitors are in the Block But Not the Building	-0.154	-0.154	-0.112	-0.087	-0.157	-0.080
	(0.079)	(0.080)	(0.074)	(0.177)	(0.107)	(0.121)
Four or More Facilities-based Competitors are in the Block But Not the Building	-0.132	-0.136	-0.085	0.351	-0.048	-0.249
	(0.117)	(0.117)	(0.117)	(0.304)	(0.152)	(0.203)
Customer is a Telecommunications Provider	-0.025	-0.025	-0.034	-0.133	-0.034	0.087
	(0.044)	(0.043)	(0.040)	(0.076)	(0.065)	(0.061)
Customer is a Mobile Telecommunications Provider	0.195	0.194	0.198	0.098	0.250	0.227
	(0.050)*	(0.050)*	(0.045)*	(0.050)	(0.059)*	(0.101)*
Customer is a Cable Operator	-0.049	-0.049	-0.062	0.092	-0.113	-0.034
	(0.048)	(0.048)	(0.045)	(0.065)	(0.081)	(0.046)
Natural Log of Establishments in the Zip Code	0.038					
	(0.146)					
Natural Log of Employment in the Zip Code	0.057					
	(0.308)					
Natural Log of Annual Payroll in the Zip Code	-0.011					
	(0.236)					
Natural Log of Number of Establishments in the Census Block (D&B)	-0.014					
	(0.030)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	0.043					
	(0.026)					
Log of Establishments per Square Mile in the Zip Code		-0.009	0.087	0.004	0.157	-0.107
		(0.125)	(0.132)	(0.137)	(0.235)	(0.160)
Log of Employment per Square Mile in the Zip Code		0.016	0.056	0.021	-0.005	0.134
		(0.123)	(0.112)	(0.100)	(0.249)	(0.130)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.053	0.238	-0.441	0.586	-0.035
		(0.261)	(0.203)	(0.222)*	(0.280)*	(0.387)
Adjusted R-Squared	0.26	0.26	0.28	0.42	0.25	0.27
F Statistic	3.69	3.30	4.42	1.28	4.21	1.25
Observations	120,110	120,109	138,158	27,253	58,790	52,115

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 19c: Regression of Log of High Bandwidth Price on Number of Competitors in the Census Block
Based on Rysman Paper Table 19

	Rysman Paper	D&B Areas	All Areas	Price Cap Areas	Phase I Areas	Phase II Areas
A Facilities-based Competitor is in the Building	-0.024	-0.023	-0.006	0.123	0.002	-0.054
	(0.043)	(0.042)	(0.038)	(0.063)	(0.051)	(0.046)
One Facilities-based Competitor is in the Block But Not the Building	0.045	0.045	0.038	0.030	0.007	0.069
	(0.034)	(0.032)	(0.029)	(0.047)	(0.040)	(0.043)
Two or Three Facilities-based Competitors are in the Block But Not the Building	0.074	0.074	0.052	0.145	-0.006	0.022
	(0.058)	(0.055)	(0.052)	(0.113)	(0.060)	(0.064)
Four or More Facilities-based Competitors are in the Block But Not the Building	0.041	0.040	0.023	0.321	-0.037	0.011
	(0.068)	(0.066)	(0.065)	(0.172)	(0.068)	(0.119)
Customer is a Telecommunications Provider	0.136	0.136	0.137	0.196	0.005	0.497
	(0.052)*	(0.052)*	(0.044)*	(0.053)*	(0.061)	(0.091)*
Customer is a Mobile Telecommunications Provider	-0.201	-0.202	-0.212	-0.202	-0.132	-0.326
	(0.104)	(0.104)	(0.083)*	(0.041)*	(0.148)	(0.065)*
Customer is a Cable Operator	-0.463	-0.462	-0.353	-0.107	-0.120	-0.683
	(0.259)	(0.258)	(0.204)	(0.185)	(0.254)	(0.330)*
Natural Log of Establishments in the Zip Code	-0.145					
	(0.103)					
Natural Log of Employment in the Zip Code	0.060					
	(0.237)					
Natural Log of Annual Payroll in the Zip Code	0.060					
	(0.168)					
Natural Log of Number of Establishments in the Census Block (D&B)	-0.001					
	(0.017)					
Natural Log of Establishments (D&B) per Square Mile in the Census Block	0.000					
	(0.015)					
Natural Log of Mbps	0.247	0.247	0.240	0.100	0.237	0.398
	(0.052)*	(0.052)*	(0.046)*	(0.037)*	(0.076)*	(0.022)*
Packet-based Connection	-0.529	-0.529	-0.619	-1.346	-0.020	-0.218
	(0.097)*	(0.097)*	(0.090)*	(0.131)*	(0.091)	(0.168)
Log of Establishments per Square Mile in the Zip Code		-0.157	-0.099	0.148	-0.297	-0.032
		(0.119)	(0.096)	(0.110)	(0.178)	(0.161)
Log of Employment per Square Mile in the Zip Code		0.119	0.086	-0.084	0.223	0.027
		(0.106)	(0.082)	(0.093)	(0.163)	(0.147)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		0.078	-0.022	-0.106	0.012	0.108
		(0.171)	(0.131)	(0.148)	(0.309)	(0.182)
Adjusted R-Squared	0.45	0.45	0.52	0.71	0.41	0.48
F Statistic	8.48	9.99	10.76	16.24	7.24	59.38
Observations	80,318	80,318	100,513	30,553	48,499	21,461

* $p<0.05$

Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level

Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors

Table 20ab: Regression of Log Price on Competition in the Block, by Price Flex Regulation
Based on Rysman Paper Table 20

	DS-1 Rysman Paper	DS-1 D&B Areas	DS-1 All Areas	DS-3 Rysman Paper	DS-3 D&B Areas	DS-3 All Areas
A Facilities-based Competitor is in the Census Block	0.001	0.008	-0.009	0.126	0.119	0.099
	(0.010)	(0.010)	(0.008)	(0.072)	(0.068)	(0.055)
Phase 1 x Facilities-based Competitor in Census Block	-0.038	-0.037	-0.012	-0.337	-0.337	-0.189
	(0.013)*	(0.013)*	(0.012)	(0.104)*	(0.104)*	(0.121)
Phase 2 x Facilities-based Competitor in Census Block	-0.048	-0.047	-0.021	-0.265	-0.259	-0.236
	(0.016)*	(0.017)*	(0.014)	(0.104)*	(0.104)*	(0.091)*
Customer is a Telecommunications Provider	-0.196	-0.196	-0.166	-0.024	-0.023	-0.033
	(0.011)*	(0.011)*	(0.010)*	(0.043)	(0.043)	(0.040)
Customer is a Mobile Telecommunications Provider	0.103	0.103	0.090	0.195	0.194	0.198
	(0.007)*	(0.007)*	(0.006)*	(0.050)*	(0.050)*	(0.045)*
Customer is a Cable Operator	-0.073	-0.073	-0.078	-0.051	-0.051	-0.064
	(0.010)*	(0.010)*	(0.009)*	(0.049)	(0.049)	(0.046)
Natural Log of Establishments in the Zip Code	0.009			0.037		
	(0.019)			(0.145)		
Natural Log of Employment in the Zip Code	-0.005			0.083		
	(0.039)			(0.303)		
Natural Log of Annual Payroll in the Zip Code	-0.015			-0.039		
	(0.028)			(0.230)		
Natural Log of Number of Establishments in the Census Block (D&B)	0.012			-0.025		
	(0.003)*			(0.034)		
Natural Log of Establishments (D&B) per Square Mile in the Census Block	-0.006			0.046		
	(0.002)*			(0.026)		
Log of Establishments per Square Mile in the Zip Code		0.007	0.026		-0.006	0.084
		(0.019)	(0.018)		(0.124)	(0.131)
Log of Employment per Square Mile in the Zip Code		-0.020	-0.039		0.014	0.057
		(0.016)	(0.013)*		(0.123)	(0.113)
Log of Average Annual Wage ($1,000) of Employees in the Zip Code		-0.010	0.023		0.024	0.222
		(0.028)	(0.027)		(0.251)	(0.202)
Adjusted R-Squared	0.33	0.33	0.38	0.26	0.26	0.28
F Statistic	89.92	108.47	106.41	4.70	4.83	6.27
Observations	1,399,170	1,399,165	1,806,659	120,110	120,109	138,158

* $p<0.05$
Fixed Effects and Cluster-Robust Standard Errors at the Census Tract Level
Highlighted Coefficients Indicate Changes in Statistical Significance Due To Use of Cluster-Robust Standard Errors